



Focus

Major Air Pollutants

Volatile Organic Compounds

Background

Volatile organic compounds (VOCs) are vapors released by cleaning fluids, degreasing agents, gasoline, paints, and other widely used products. They include hydrocarbons, some toxic chemicals (diethyl sulfate, tetramethyl lead) and some carcinogens (benzene, vinyl chloride). They contain carbon, hydrogen, and other elements including oxygen, nitrogen, sulfur chlorine, and fluoride. They are in gaseous form under normal atmospheric conditions.

Volatile organic compounds in Washington State

VOCs are not regulated pollutants, but interact with nitrogen oxides in the presence of sunlight to form ozone and other smog. The federal Environmental Protection Agency declares areas “nonattainment” when levels of certain air pollutants do not meet federal health-based standards. Until 1996, south Clark County and the Puget Sound area were nonattainment areas for ozone. Because both of these areas now meet the ozone standard, they are listed as “maintenance areas.” Ozone remains a concern in these regions due to population growth and increased motor vehicle use.

Health effects of volatile organic compounds

As a group, VOCs are of concern because they are an ingredient of ozone. Ozone can pose serious health problems. It can inflame and irritate breathing passages, reduce resistance to other illnesses, and cause coughing, wheezing, headaches, and nausea. People who are exposed to ozone can experience a tired feeling, shortness of breath, or pain during deep breaths. (See Focus sheets FA-92-30, Nitrogen Oxides, and FA-91-128, Ozone).

Individually, some VOCs are toxic chemicals, including irritants and neurotoxins that can cause headaches and inability to concentrate. Some toxic VOCs include:

- **Toluene**, a common component of printing inks, paints and solvents which can affect the nervous system. Toluene is emitted into the outside air from businesses such as plastic wrapper printing facilities and painting operations.
- **Trichloroethylene**, a solvent commonly used to clean and degrease metal aircraft and other mechanical parts, which is a probable human carcinogen.
- **Perchloroethylene**, a cleaning agent used by dry cleaners, which is a probable human carcinogen.

Other effects of volatile organic compounds

In addition to their effects on human health, VOCs can also damage other organisms and materials through their role in producing ozone. Ozone can reduce the size of plants and cause leaf spotting. It can change the color of clothing dyes, cause fabrics to lose strength, and corrode some metals.

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Both the National Park Service and the U.S. Forest Service have expressed concerns about existing levels of ozone in the Cascade Mountains and its possible effects on national parks and wilderness areas.

Controlling volatile organic compounds

Ecology and local air pollution control agencies have been pursuing strategies to control volatile organic compounds and nitrogen oxides. In addition, the Washington Clean Air Act adopted in 1991 includes measures for reducing the amount of ozone in the air. These include:

- Motor vehicle emission checks;
- Reductions in traffic and the use of single-occupant vehicles;
- A permit program for industrial facilities;
- Research into and use of alternative fuels; and
- Permitting programs to reduce outdoor burning.

For more information

Focus sheets on other major pollutants, as well as on air quality programs, are available from the Washington State Department of Ecology, P.O. Box 47600, Olympia, WA 98504-7600; or by calling:

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If you have special accommodation needs or require this document in alternative format, please call Tami Dahlgren at (360) 407-6830 (voice); or (360) 407-6006 (TDD only).